

Claims

1. An electronic device, comprising:  
at least one channel with
  - 5 a fluid fillable channel interior and  
an electrically insulating wall surrounding at least partially the  
channel interior, which channel interior, in use, contains charge  
carriers,  
which electronic device further comprises:
    - 10 at one control electrode, which electrode is electrically isolated from  
the channel interior and in capacitive contact with the channel  
interior.
2. An electronic device as claimed in claim 1, wherein the at least one  
15 channel in use contains a liquid in which charge carriers are present.
3. An electronic device as claimed in claim 1 or 2, wherein the charge  
carriers include ions.
- 20 4. An electronic device as claimed in claim 2 or claims 2 and 3, wherein  
the liquid is an aqueous solution.
5. An electronic device as claimed in claim 3 and 4, wherein the ions  
include salt ions.  
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6. An electronic device as claimed in claim 1, wherein the charge  
carriers include electrons.
7. An electronic device as claimed in any one of the preceding claims,  
30 wherein the at least one channel has:

- a channel inlet, and  
a channel outlet, at which channel inlet and outlet control electrodes are  
provided, which control electrodes are each electrically connected to a  
control device arranged for controlling electrical properties of the channel  
5 inlet and outlet.
8. An electronic device as claimed in any one of the preceding claims,  
comprising at least two parallel channels.
- 10 9. An electronic device as claimed in claims 8 and any one of claims 1-7,  
wherein two parallel channels are connected by at least one cross channel.
10. An electronic device as claimed in any one of claims 1-9, wherein at  
least two of the control electrodes are positioned facing each other on  
15 opposite sides of the channel.
11. An electronic device as claimed in claim 10, wherein said at least two  
facing control electrodes are electrically connected to each other
- 20 12. An electronic device as claimed in any one of claims 1-11, wherein at  
least two of the control electrodes are electrically insulated from each other.
13. An electronic device as claimed in any one of claims 1-12, further  
comprising a control device, communicatively connected to the control  
25 electrodes, which control device is arranged for controlling electrical  
properties of the electrodes.
14. An electronic device as claimed in claim 13, wherein the control  
device includes a software programmable apparatus.

15. An electronic device as claimed in any one of the preceding claims, further including at least one direct electrode in conductive contact with the channel interior.
- 5 16. An electronic device as claimed in claim 9, wherein said cross channel is situated between two adjacent electrodes of at least one of said channels as seen in the longitudinal direction of said channels.
- 10 17. An electronic device as claimed in any one of the preceding claims, wherein at least one of said electrodes is a gate electrode.
18. An electronic device as claimed in any one of the preceding claims, wherein at least one channel has a rectangular shaped cross-section.
- 15 19. An electronic device as claimed in any one of the preceding claims, wherein at least one channel is a substantially straight channel.
- 20 20. An electronic device as claimed in any one of the claims 1-18, wherein at least one channel has a curved shape.
21. An electronic device as claimed in claim 20, wherein said channel has an annular shape.
- 25 22. An electronic device as claimed in any one of the preceding claims, further comprising: a catalyst or reactant material on the electrically insulating wall in said channel interior, which material in use lies within an electrical field of at least one of the electrodes.
- 30 23. An electronic device as claimed in any one of the preceding claims, wherein at least a part of the electrically insulating wall contains a

permeable material through which permeable material a reaction or catalysis product can diffuse out of said channel.

24. An electronic device as claimed in any one of the preceding claims,  
5 wherein a polyelectrolyte material is present in the channel.

25. An integrated circuit comprising at least one device as claimed in any one of the preceding claims.

10 26. A method for processing a signal, comprising:  
applying a voltage to at least one of said plurality of control electrodes of a device as claimed in any one of claims 1-24 and  
applying a preparation force corresponding to said signal to charge carriers in the channel interior, which force has at least a component in a  
15 longitudinal direction of the channel.

27. A method for transporting a fluid, comprising  
filling a channel of a device as claimed in any one of the claims 1-24 a fluid containing charge carriers and  
20 applying a voltage to at least one of said plurality of control electrodes of said device as claimed in any one of claims 1-24 such that the charge carriers are moved by an electrical field of the at least one control electrode and the charge carriers transfer at least a part of their energy to kinetic energy of the fluid.

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28. A method for separating compounds in a fluid, comprising:  
filling a device as claimed in any one of claims 1-24 with a fluid containing charge carriers with positive and negative charges;  
applying a positive voltage to at least one first control electrode of the  
30 device;

applying a negative voltage to at least one second control electrode of the device.

29. A method for preparing a fluid comprising filling at least one  
5 channel of a device as claimed in any one of claims 1-24 with a fluid and  
controlling the control electrode in such a manner that a difference in  
voltage moves along the length of the channel.
30. A method for mixing at least two fluids, comprising  
10 filling at least one channel of a device as claims in any one of claims 1-24  
with a first fluid and a second fluid applying a voltage to at least one control  
electrode, and alternating the voltage on at least one of said control  
electrodes.
31. A method for producing a chemical reaction, comprising:  
15 filling a channel of a device as claimed in any one of claims 1-24 with a  
suitable reactant and  
applying a voltage to at least one control electrode of the device, such that  
the electrochemical energy of the reactant is increased to at least the  
20 activation energy of the reactant.
32. A control device for controlling at least one of the control electrodes of  
an electronic device as claimed in any one of claims 1-24.
33. A computer program product, comprising program code for  
25 performing steps of a method as claimed in any one of claims 26-31 when  
run on a programmable device.